CHP/DER Issues in Virginia

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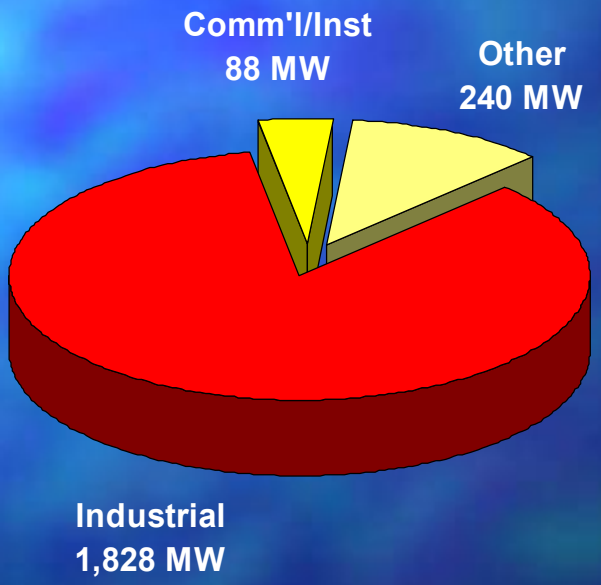
Overview

- Market base and potential (EEA, Inc.)
- Utilities and utility regulations
- Air quality regulations
- Major barriers and issues

Existing CHP in Virginia (EEA estimates)

2,156 MW at 49 sites

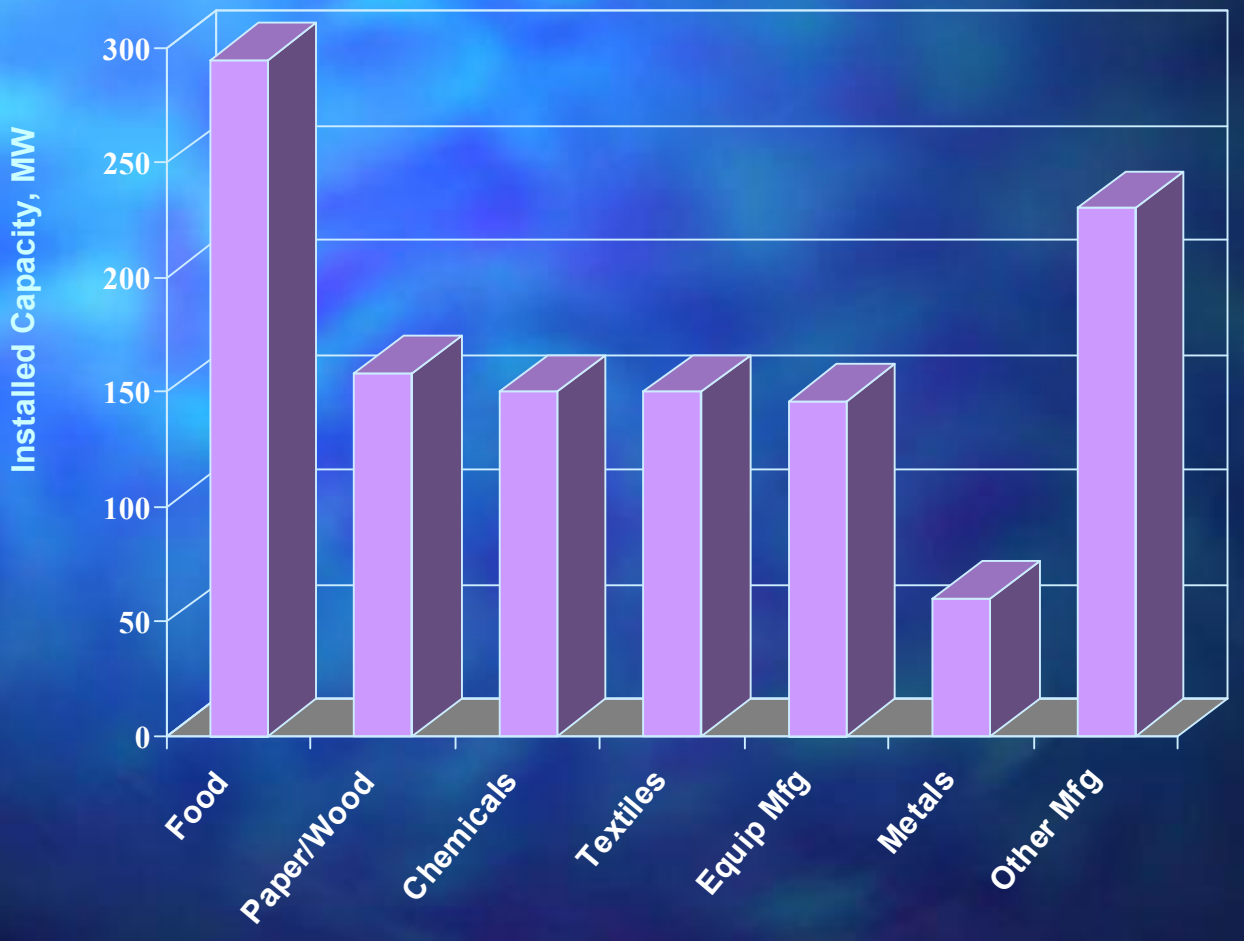


(vs. US 77,700 MW at 2,749 sites)

Potential for additional CHP in Virginia

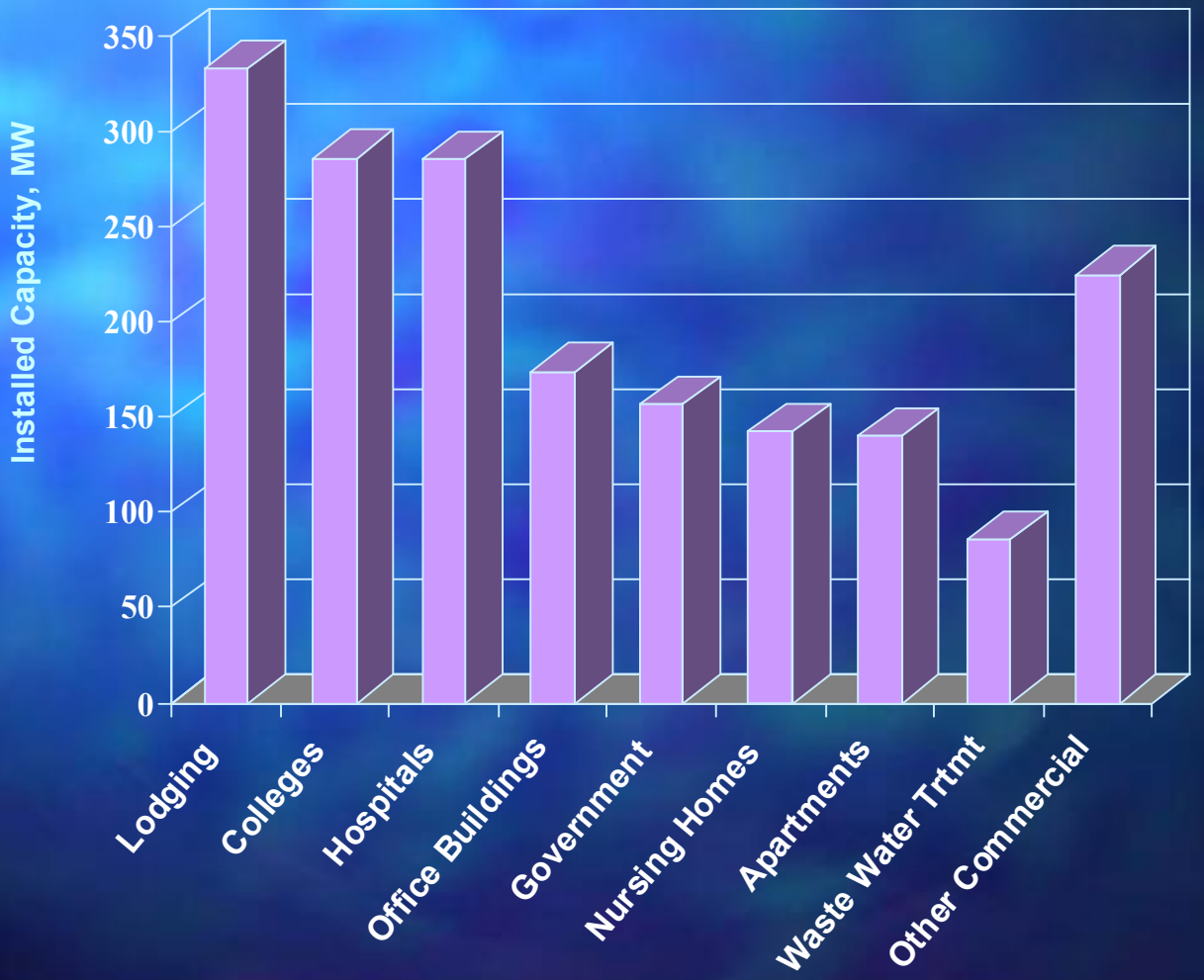
- **3,500 MW** at existing sites
  - 43% industrial
  - 57% commercial/institutional
- *Technical potential*, no economic screening
- *Existing sites* with conducive thermal and electric loads
- *Within-the-fence*--sized to meet thermal load w/o power export

CHP Potential in Industrial Applications - Virginia



Source: EEA

CHP Potential in Commercial and Institutional Applications - Virginia

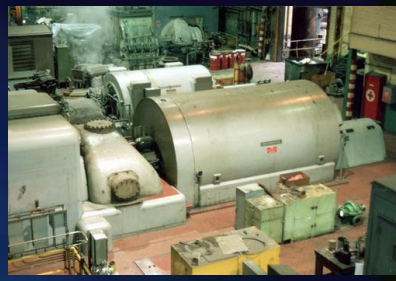


Source: EEA

Market Base and Potential

- Remaining industrial and commercial/institutional potential is large
- Much of remaining potential for smaller systems--under 5 MW and under 1 MW
- Technology advance critical
  - Improved engines and turbines
  - Microturbines and fuel cells
  - Absorption chillers and desiccants
- Site specific considerations
  - thermal loads, adequate fuel availability, on-site fuels (e.g., biogas, scrap)

Utilities and Utility Regulations

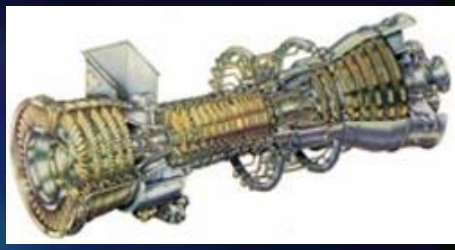


- Mixed or uncertain utility view of CHP/DER
- Interconnection queue process oriented to big generators
  - $10k deposit, interconnection studies, generator pays for upgrades, monthly charges
- Rural co-ops and municipals may not have clear interconnection procedures
- Awaiting FERC small generator ANOPR process

Utilities and Utility Regulations

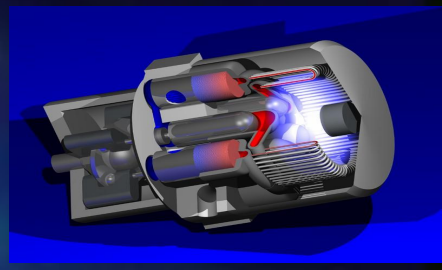
- State Corporation Commission regulates siting of generating units >50 MW but exempts DER
- No DER interconnection rule except…
- Net metering for solar, wind, small hydro
  - limit being raised from 25 kW to 500 kW
  - initiated rulemaking to accommodate increase--e.g., interconnection requirements
- Could net metering interconnection req’ts be adapted for non-net metering up to 500 kW?

Utilities and Utility Regulations



- Other utility issues--
  - Utility restructuring--theoretically competitive market, in reality minimal/no retail competition
  - Wires charge until July 2007 on retail power
    - though provision for some customers to avoid wires charge if they forgo capped rates should they go back to incumbent electric utility (Code of VA § 56-583)
  - Dominion VA Power to join PJM
  - AEP wants to join PJM
  - Green power markets just starting

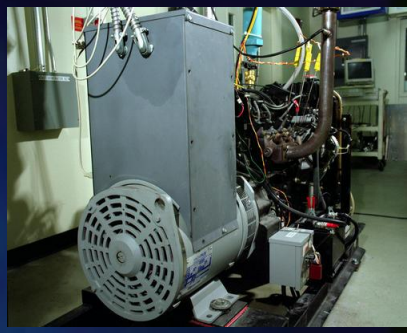
Air Quality Regulations



- No specific CHP/DER provisions
- No recognition of thermal credit or use of output-based emissions limitations

  (though federal NSPS for utility boilers [40 CFR 60 Subpart Da] is output-based)
- No SIP credit for displaced utility power generation
  - But following Montgomery Co., MD proposal for green power in MD SIP--requires EPA approval
  - Could be precedent for VA--green power, end-use efficiency, and CHP

Air Quality Regulations



- NSR permit exemptions (9 VAC 5-80-1320) include, among others--
  - External combustion units with heat input:
    solid fuel < 1 million Btu/hr heat input
    liquid or liquid/gas < 10 million Btu/hr input
    gas < 50 million Btu/hr input
  - Emergency engines and turbines operating 500 hr or less per yr below certain size
  - Exhaust flares at natural gas and coalbed methane extraction wells

Air Quality Regulations

- Exemptions (continued)
  - New source with potential to emit less than

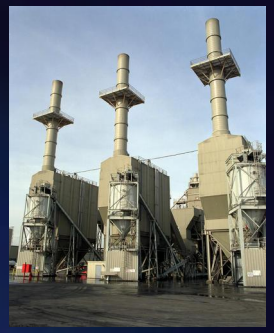
CO	100 t/yr	NO_x	40 t/yr	
SO_2	40	PM	25	
PM_{10}	15	VOC	25	and others*

  - Modification or reconstruction with net emissions increase less than

CO	100 t/yr	NO_x	10 t/yr	
SO_2	10	PM	15	
PM_{10}	10	VOC	10	and others*

*Municipal waste combustion gases are among these

Air Quality Regulations



- Permit req'd for modifications to facility but...
- Modification (9 VAC 5-80-1110) defined as physical or operational change that would result in *net emissions increase* in regulated pollutants
- Unless limited by previous permit conditions:
  - Alternative fuel or raw material may not necessarily be a *modification* if emissions would decrease
  - Adding a system or device whose primary function is to reduce air pollution is not necessarily a *modification*

Major Barriers and Issues

- Spark spread--VA electricity a little cheaper than median US state and natural gas more expensive than US average

EIA data (2002 electric; 2004 YTD natural gas [avg. city gate])

	cents/kWh	% of median (rank)	$/1000 cf	% of US avg.
DE	7.05	112% (17)	$6.12	96%
DC	7.37	117 (14)	na	
MD	6.21	98 (31)	7.30	114
NJ	9.31	148 (10)	7.54	118
PA	8.01	127 (13)	6.81	107
VA	6.23	99 (30)	7.01	110
WV	5.11	81 (49)	6.37	100
median	6.31 (KS)	(25)	avg. 6.37	

Major Barriers and Issues

- Customer/user objectives
  - Most users not interested in being in power business--don't want complex process, utility agreements, O&M, etc.
  - Need ESCO approach--vendor build, operate, arrange interconnect and permits, and perhaps own CHP/DER … or …
  - Need plug-and-play technology that requires minimal user attention

Major Barriers and Issues

- Utility processes
  - Interconnection process not yet standard
  - Oriented toward large generators
  - Standby rates--anecdotal examples
  - Utility competition

    anecdotal: CHP/DER developer notes last minute utility rate concessions to customers considering CHP/DER
  - FERC small generator ANOPR

Major Barriers and Issues

- Air quality regulations: no "credit" for displaced utility emissions in permits or SIPs
  - Regulators ask "how do you know that the utility won't generate the same amount and sell the power elsewhere?"
  - Displaced generation and emissions varies with utility dispatch
  - Plans focus on regional attainment of ambient air quality standards (i.e., displacing distant generation may be lower priority than reducing nearby emissions)

Major Barriers and Issues

- If green power accepted by EPA as emissions reduction in SIP, may be precedent for CHP
- Regulators are cautious:
  - permit conditions must be "practically enforceable"
  - SIP emissions reductions must be quantifiable and verifiable

- Air quality regulations: standards generally not energy output based.
  - Federal NSPS for utility boilers is output-based
  - Permit exemptions and major source threshold can be based on emissions levels irrespective of heat input or energy output

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Images courtesy: DOE, National Renewable Energy Lab and California Energy Commission web sites; STM Power Inc.; Ingersoll-Rand Co., IR Powerworks.